



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE CIVIL ENGINEER SUPPORT AGENCY

SEP 5 2002

FROM: HQ AFCESA/CESC
139 Barnes Drive, Suite 1
Tyndall AFB FL 32403-5319

SUBJECT: **Engineering Technical Letter (ETL) 02-8: Silicone Joint Sealant Specification for Airfield Pavements**

1. Purpose. This ETL provides a specification for silicone joint sealants for sealing joints in concrete pavements on Air Force airfields.

Note: The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the Air Force.

2. Application: Portland cement concrete (PCC) airfield pavements not subject to frequent fuel spillage.

2.1. Authority: Unified Facilities Criteria (UFC) 3-260-02, *Pavement Design for Airfields*.

2.2. Coordination: Major command (MAJCOM) pavement engineers.

2.3. Effective Date: Immediately.

2.4. Ultimate Recipients:

- MAJCOM pavement engineers
- Base civil engineers (BCE) and other engineers responsible for airfield design and maintenance
- U.S. Army Corps of Engineers (USACE) and Navy offices responsible for Air Force design and construction

3. Referenced Publications:

3.1. Unified Facilities Criteria (UFC):

- UFC 3-260-02, *Pavement Design for Airfields*

3.2. Unified Facilities Guide Specifications (UFGS):

- UFGS 02760a, *Field Molded Sealants for Sealing Joints in Rigid Pavements*

3.2. Federal Specifications:

- Federal Specification SS-S-200E, *Sealants, Joint, Two-Component, Jet-Blast Resistant, Cold-Applied, for Portland Cement Concrete Pavement*.

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3.3. American Society for Testing and Materials (ASTM):

- ASTM D 5249, *Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland Cement Concrete and Asphalt Joints*
- ASTM D 5893, *Standard Specification for Cold-Applied, Single-Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements*

4. Acronyms and Terms:

ASTM	- American Society for Testing and Materials
BCE	- base civil engineer
ETL	- Engineering Technical Letter
FS	- Federal Specification
MAJCOM	- major command
NS	- non-sag
PCC	- Portland cement concrete
SL	- self-leveling
UFC	- Unified Facilities Criteria
UFGS	- Unified Facilities Guide Specifications
USACE	- U.S. Army Corps of Engineers

5. Point of Contact. Recommendations for improvements to this ETL are encouraged and should be furnished to: HQ AFCESA/CESC, 139 Barnes Drive, Suite 1, Tyndall AFB, 32403-5319, Attention: Mr. Jim Greene, DSN: 523-6334, commercial: (850) 283-6334, FAX DSN: 523-6219, email: james.greene@tyndall.af.mil; or J. Kent Newman, U.S. Army Engineer Research and Development Center, CEERD-GM-A, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, telephone: (601) 634-3858, FAX: (601) 634-3020, email: john.k.newman@erdc.usace.army.mil

MICHAEL J. COOK, Colonel, USAF
Director of Technical Support

Atchs
1. Silicone Joint Sealant
2. Distribution List

SILICONE JOINT SEALANT

A1.1. Silicone Sealant Types. Silicone sealants are generally of two types: high-modulus (non-sag [NS]) for vertical and horizontal applications, and low-modulus (self-leveling [SL]) for horizontal applications only. High-modulus sealants must be tooled into the joint to provide proper joint face wetting and ensure good adhesion.

A1.2. Silicone Sealant Application.

A1.2.1. Silicone sealants can be used on PCC pavement, except for areas exposed to frequent (defined as more than one spill daily) fuel spills that are allowed to pool in concrete joints. Silicone sealants will swell in the presence of fuel and some synthetic lubricating fluids such as jet turbine oils. Volatile fluids such as fuels will cause temporary swelling but will not cause adhesion loss after evaporation if fuel contact does not occur on a daily basis.

A1.2.2. NS silicone sealants are recommended for runway applications. The high-modulus NS material is better suited to withstand the forces from aircraft landings and high-pressure waterblasting than SL low-modulus silicone sealants. For high-temperature applications, i.e., where jet blast may impact the joints, fluorosilicone (NS) sealants are recommended as they have been shown to perform better than Federal Specification (FS) SS-S-200 sealants.

A1.3. Specific Requirements. The silicone joint sealant will be non-acid curing, and satisfy the criteria in American Society for Testing and Materials (ASTM) D 5893, *Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements*. Backer rod must meet the requirements outlined in ASTM D 5249, *Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland Cement Concrete and Asphalt Joints*. The sealant must show no sign of ignition, support of combustion, hardening, or loss of flexibility, flow, or separation during heat exposure, or upon cooling, or any separation or loss of adhesive strength between sealant and concrete blocks, when exposed to a temperature of 260 °C (500 °F) for 120 seconds, when tested according to FS SS-S-200E, *Sealants, Joint, Two-Component, Jet-Blast Resistant, Cold-Applied, for Portland Cement Concrete Pavement*, Section 4.4.12. (See paragraph A1.4 of this ETL for a description of the testing procedure). Specimens for flame resistance testing can be used after passing the non-immersed bond test (see ASTM D 5893, Section 8.8.3).

A1.3.1. Joint Preparation. All joints must be prepared according to procedures outlined in the appendix of ASTM D 5893 (see also UFGS 02760a, *Field Molded Sealants for Sealing Joints in Rigid Pavements*).

A1.3.2. Shape Factor. The ratio of the depth of sealant divided by the width of the joint is referred to as the shape factor. For silicone sealants the shape factor will be no less than 0.5 and no greater than 1.0. For example, if the joint is 13 millimeters (0.5 inch) in

width, the depth of silicone sealant should be between 6 millimeters (0.25 inch) and 13 millimeters.

A1.3.3. Sealant Recess. Silicone joint sealant should be recessed at least 6 millimeters below the joint surface, but no deeper than 8 millimeters (0.375 inch). The sealant will not be placed flush with the joint surface.

A1.3.4. Repair and Maintenance Techniques. Small repairs of silicone sealant can be accomplished by hand-applied caulking guns and small tubes of sealant obtained from the manufacturer. Silicone sealants should only be repaired with silicone sealant meeting this ETL specification. A silicone sealant should be repaired with the same type of sealant from the same manufacturer.

A1.4. Flame Resistance Test.

A1.4.1. Apparatus. The heat source must be a high-temperature laboratory burner rated to supply 2930 watts (10,000 British thermal units per hour). These can be obtained from most laboratory supply companies; for example, the Fisher Scientific Company's AccuFlame™ Natural Gas Burner. For a draft shield, use an open-end cylinder of light-gauge metal with a diameter of 127 millimeters (5 inches) and a height of 305 millimeters (12 inches). A specimen support is fashioned by welding two 150-millimeter (6-inch) rods and two 51-millimeter (2-inch) rods to form a support across the draft cylinder, with a rectangular opening of 51 by 64 millimeters (2 by 2.5 inches). In some cases, a secondary draft shield at the top of the primary shield may be needed to maintain the required temperature at the supports.

A1.4.2. Procedure. A tripod or similar support can be used to place the draft shield on top of the burner. The top of the burner should be flush with the bottom of the draft shield (both should be on the same plane). Place a laboratory thermometer on the top of the draft shield specimen supports in a horizontal position so that the thermometer bulb is in the center. Regulate the burner to achieve a temperature of 260 ± 11 °C (500 ± 20 °F) for 120 seconds. Remove the thermometer and place the specimen with the long side of the concrete blocks parallel to the long specimen support rods and centered within the draft shield. The specimen should be oriented so that the top sealant surface that was open to cure is facing downward and is exposed to the heat and flame. Allow the specimen to remain in place for 120 ± 1 seconds. Observe the specimen for evidence of ignition, flow, hardening, or separation. Remove the burner at the end of the 120-second exposure and allow the specimen to cool to room temperature while remaining on the specimen supports. Examine the specimen again for signs of ignition, support of combustion, hardening, cracking, loss of flexibility, flow, or bond separation at the concrete interface.

DISTRIBUTION LIST

DEPARTMENT OF DEFENSE

Defense Commissary Service (1)
Director of Facilities
Bldg 8400
Lackland AFB TX 78236-5000

Defense Technical Information Center (1)
ATTN: DTIC-FDA
Alexandria VA 22034-6145

AAFES/ATTN: CFE (1)
PO Box 660320
Dallas TX 75266-0320

SPECIAL INTEREST ORGANIZATIONS

IHS (A.A. DeSimone) (1)
1990 M Street NW, Suite 400
Washington DC 20036

Construction Criteria Database (1)
National Institute of Bldg Sciences
1201 L Street NW, Suite 400
Washington DC 20005